CLAIMS

What is claimed is:

1. A composite dual core-spun yarn with substantially no torque and having a central hard core covered with a dual-spun fiber covering, wherein the central hard core has an elongation at break less than 50% measured according to the methodology of ISO 2062 and has a Z or S twist, and the fiber covering comprises fibers twisted on the core with an S or Z twist opposite to that of the core, the opposite twists of the core and of the covering exerting opposite and substantially equal torques.

2. The composite core-spun yarn of claim 1, wherein the core is chosen from the group consisting of monofilaments, multiple filaments, spun yarns and composites thereof.

3. The composite core-spun yarn of claim 1, wherein the core and the fiber covering are each independently made of materials chosen from the group consisting of glass, metal, synthetic fibers and filaments, carbon multifilaments and fibers, artificial fibers, natural fibers, antistatic fibers and composites thereof.

4. The composite core-spun yarn of claim 3, wherein the core is made of aramid fibers.

5. The composite core-spun yarn of claim 3, wherein the covering is made of viscose fibers.

6. The composite core-spun yarn of claim 1, wherein the core is covered at least 90% by the covering.

7. The composite core-spun yarn of claim 1, wherein the core constitutes 10 – 30 wt% of the yarn.

8. The composite core-spun yarn of claim 1, wherein the fiber covering is a functional covering providing at least one of: high visibility, low friction,

reinforcement, light-fastness, aesthetic appearance, UV-protection, protection of the core, abrasion resistance, resistance against heat, thermal performance, fire-resistance, protection against molten metal adhesion, adhesion, anti-static effect, anti-bacterial effect and comfort.

9. The composite yarn of claim 1, wherein the core has a twist coefficient α in the range 35-60 turns x $g^{1/2}$ x $m^{-3/2}$,

where α = twist/$(1000/tex)^{-1/2}$ and

tex = 1000 x mass(g)/length(m).

10. A fabric woven or knitted from composite core-spun yarn as claimed in claim 1.

11. A process for producing a composite dual core-spun yarn with substantially no torque and having a central hard core covered with a dual-spun fiber covering, wherein the central hard core has an elongation of break less than 50% measured according to the methodology of ISO 2062, the process comprising:

(a) bringing together two fiber slivers to form a spinning triangle;

(b) feeding the central hard core in the spinning triangle between the two fiber slivers with the latter at an angle to the central core, the fed core being guided in the spinning triangle and having a Z or S twist that is overtwisted relative to the twist of the finished composite yarn;

(c) controlling the speed of feeding the core in the spinning triangle to compensate for the angle between the slivers and the core and for detwisting elongation of the core; and

(d) spinning the brought-together fiber slivers around the core with an S or Z twist opposite to that of the core and corresponding to about 30% to about 70% of the twist of the fed overtwisted core to obtain a composite core-spun yarn with substantially no torque.

12. The process of claim 11, wherein the slivers are inclined at an angle θ to the fed core, the slivers are fed to the spinning triangle at a speed V, and the central hard core

is fed to the spinning triangle at a speed close to $k.V.\cos\theta$, where k is a factor compensating for the detwisting elongation of the core.

13. The process of claim 11, wherein the core is chosen from the group consisting of monofilaments, multiple filaments, spun yarns and composites thereof.

14. The process of claim 11, wherein the core and the fiber covering are each independently made of materials chosen from the group consisting of glass, metal, synthetic fibers or filaments, carbon multifilaments or fibers, artificial fibers, natural fibers, antistatic fibers and composites thereof.

15. The process of claim 11, wherein the two inclined slivers are obtained by feeding from two parallel rovings.

16. The process of claim 11, wherein the core is driven at a controlled speed by a positive drive or by braking an overfed core.

17. The process of claim 11, wherein the two fiber slivers are brought together in the spinning triangle by passing over a feed roller having lateral smooth guide surfaces for the slivers, and the core is guided in the spinning triangle by passing through a guide groove centrally located on the feed roller.

18. The process of claim 11, wherein the core as fed has a twist coefficient α in the range 70-120 turns x $g^{1/2}$ x $m^{-3/2}$,

where $\alpha = \text{twist}/(1000/\text{tex})^{-1/2}$ and

$\text{tex} = 1000 \times \text{mass(g)}/\text{length(m)}$

and wherein the hard core in the composite dual-spun yarn has a twist coefficient α in the range 35-60 turns x $g^{1/2}$ x $m^{-3/2}$.

19. A device for producing a composite dual core-spun yarn with substantially no torque and having a central hard core covered with a dual-spun fiber covering, wherein the central hard core has an elongation of break less than 50% measured according to

the methodology of ISO 2062, the core has an Z or S winding and the fiber covering has an S or Z winding opposite to that of the core, the device comprising:

(a) means for bringing together two fiber slivers in a spinning triangle;

(b) means for feeding said core in the spinning triangle between the two fiber slivers whereby the core is guided in the spinning triangle with the two fiber slivers at an angle to the core, the core having a Z or S winding that is overtwisted relative to the twist of the finished composite yarn;

(c) means for controlling the speed of feeding the core in the spinning triangle to compensate for the angle between the slivers and the core and for detwisting elongation of the core; and

(d) means for spinning the brought-together fiber slivers around the core with an S or Z winding opposite to that of the core and corresponding to about 30% to about 70% of the twist of the fed overtwisted core to obtain said composite core-spun yarn with substantially no torque.

20. The device of claim 19, wherein the means for bringing together the two fiber slivers in a spinning triangle comprise a feed roller having lateral smooth guide surfaces for the slivers, and the means for feeding and for guiding the core in the spinning triangle comprise a guide groove centrally located on the feed roller.

21. The device of claim 20, wherein the guide groove is of substantially U-shaped cross section, the width and depth of the guide groove being sufficient to receive therein the core.

22. The device of claim 20, comprising a centering roller cooperating with the feed roller, the centering roller having a pre-guide groove positioned to guide the core centrally into the guide groove in the feed roller.

23. The device of claim 19, comprising means for positively driving the core at an adjusted speed, or for braking an overfed core to an adjusted speed.